

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Revision of Part 15 of the Commission's Rules)	ET Docket No. 98-153
Regarding Ultra-Wideband Transmission Systems)	
_____)	

SPRINT CORPORATION COMMENTS

Sprint Corporation, on behalf of its local, long distance and wireless divisions (collectively, "Sprint"), submits these comments on the Qualcomm Report addressing the interference that ultra-wideband ("UWB") devices will cause to code-division multiple access ("CDMA") systems operating in the 1850-1990 MHz PCS spectrum band.¹

I. QUALCOMM'S TESTS CONFIRM THE PREVIOUSLY SUBMITTED RESULTS OF SPRINT PCS/TIME DOMAIN'S TESTS: UWB DEVICES WILL CAUSE HARMFUL INTERFERENCE TO CDMA PCS NETWORKS

Qualcomm, based on the results of laboratory testing, has concluded that the operation of UWB devices in the 2 GHz band "will have harmful impact on the normal operation of CDMA wireless devices in the voice, data and GPS modes."² These tests thus independently confirm the data obtained in the Sprint PCS/Time Domain tests.³

¹ See *Public Notice*, "Comments Requested on Reports Addressing Potential Interference from Ultra-Wideband Transmission Systems," ET Docket No. 98-153, DA 01-753 (March 26, 2001). See also Qualcomm Report, ET Docket No. 98-153 (March 5, 2001).

² Qualcomm Report at 25 (emphasis added).

³ While the Sprint PCS/Time Domain tests used a Time Domain UWB device, Qualcomm used a device manufactured by HyperLabs. See Qualcomm Report at 14.

Last year, Sprint PCS and Time Domain Corporation conducted joint tests to determine the impact that UWB devices may have on PCS CDMA networks. The two parties jointly submitted a summary of the test results and an impact analysis model that Telcordia Technologies prepared.⁴ The data confirmed that UWB devices will cause harmful interference to PCS CDMA networks even at the more stringent -53.2 dBm/MHz average power level discussed in the *NPRM*.⁵ One effect of UWB interference was the loss of PCS network capacity. At the -53.2 dBm/MHz emissions level, a fair signal (-90 dBm RSSI) PCS handset will ask for 8% more power when exposed to a UWB device two meters away. A weaker signal (-100 dBm RSSI) handset will demand 50% more power. The network capacity loss at a base station could be considerable if several PCS customers are near active UWB devices.⁶

A second and separate effect of UWB interference is call blocking – namely, a PCS call will drop or a call attempt will be blocked if the handset is too close to an active UWB device. At the -53.2 dBm/MHz emission level suggested in the *NPRM* (and assuming that between one in twenty and one in five PCS customers are within three meters of an active UWB device), the model demonstrates that the resulting additional blocking percentages are from 1.2% to 4.8%, respectively. At two meters, the additional blocking rates increase to 2.0% and 7.9%,

⁴ See Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, “A Model for Calculating the Effect of UWB Interference on a CDMA PCS System” (Sept. 12, 2000), *appended as* Attachment 1 to the September 12, 2000 Sprint PCS and Time Domain letters; Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, “Summary of Testing Performed by Sprint PCS and Time Domain to Characterize the Effect of Ultra Wideband (UWB) Devices on an IS-95 PCS System” (Sept. 12, 2000), *appended as* Attachment 2 to the September 12, 2000 Sprint PCS and Time Domain letters. See also Sprint PCS Supplemental Comments, ET Docket No. 98-153 (Oct. 6, 2000).

⁵ See *UWB NPRM*, ET Docket No. 98-153, FCC 00-163, 15 FCC Rcd 12086 (May 11, 2000).

⁶ As an example, using the more stringent -53.2 dBm/MHz average power level, a medium sized city (200 cell sites), and a significant distribution of UWB devices, Sprint PCS would be able to serve from 250 to 1,000 fewer customers at times during the busy hour — *solely as a result of UWB interference*.

respectively. To put these figures into perspective, Sprint PCS spends tens of millions of dollars each year adding “capacity” cell sites to reduce its call blockage rate by less than one percent.

Several UWB proponents have acknowledged, from the outset, that UWB devices should not be permitted in the spectrum bands below 3.1 GHz. For example, Multispectral Solutions (“MSSI”), which has over a decade of experience in developing UWB technologies, recognizes that UWB will cause “significant” interference to PCS networks, and it accordingly recommends that unlicensed UWB devices not be permitted to operate in the frequency range below 3.1 GHz:⁷

Unfortunately, while some UWB advocates have claimed that UWB operates in the “garbage band” and can superimpose its emissions on existing services without interference thereby “creating spectrum,” such statements are without basis in fact and, in fact, have shown to be false.⁸

Similarly, the NTIA, following its own, independent study, has concluded that the operation of UWB devices below 3.1 GHz “will be challenging.”⁹

Other UWB proponents contend that Sprint PCS, and other carriers, should attempt to compensate for UWB interference by installing more base stations (cell sites) in order to maintain current levels of services to existing customers.¹⁰ Time Domain, for example, has asserted that Sprint PCS should design its network for a handset sensitivity of -95 dBm rather

⁷ See MSSI Reply Comments, Docket No. 98-153, at 1-2 (Oct. 27, 2000). See also *id.* at 3 (“While higher frequency operation may require some additional engineering effort [for UWB devices] it is a far better alternative than interference to safety-of-life and other key commercial spectrum users.”).

⁸ See MSSI Comments, Docket No. 98-154, at 10-12 (Sept. 12, 2000). See also *id.* at 1 (Unfiltered UWB systems “should not be permitted under Part 15,” and filtered systems should initially be permitted only “above 3.1 GHz.”); at 13 (“[T]here is no compelling reason to operate below 3.1 GHz for the types of applications contemplated for UWB communications and radar.”)

⁹ NTIA Report, “Assessment of Compatibility Between Ultrawideband Devices and Selected Federal Systems,” NTIA Special Publication 01-43, Docket No. 98-153, (Jan. 2001).

¹⁰ As Qualcomm notes, the “degree to which a CDMA phone is susceptible to interference from a nearby device is dependent on the strength of the CDMA signal. The weaker the CDMA signal, the more susceptible it is to the interference from the UWB devices.” Qualcomm Report at 5.

than the current sensitivity of -105 dBm.¹¹ (It is noteworthy that Time Domain has not offered to reimburse Sprint PCS for the hundreds of millions of dollars it would have to spend to achieve the design limits that Time Domain prefers.)

The simple response is that Sprint PCS and other PCS licensees have no such obligation to modify their networks. For its part, Sprint PCS paid the government billions of dollars for its exclusive radio licenses. Sprint PCS certainly need not modify its network so UWB proponents can use Sprint PCS' spectrum for free to provide services that would compete with Sprint PCS' own services. Moreover, there is no guarantee that even such a massive and costly network re-design would eliminate the interference problem since, according to UWB proponents, this design would only reduce the risk of interference. Finally, there is a growing consensus that the aggregate effect of multiple UWB devices will pose an even more serious interference problem,¹² yet those UWB proponents wanting to use the 2 GHz band still have not conducted aggregate interference tests in an effort to rebut this concern.

Those UWB proponents wanting to use the 2 GHz PCS band have the burden of demonstrating that there is "no potential for interference."¹³ UWB proponents have not begun to meet this burden, at least with respect to the spectrum below 3.1 GHz. To the contrary, the Sprint PCS/Time Domain and Qualcomm tests demonstrate conclusively that UWB devices will

¹¹ See Time Domain Reply Comments, at 41-42. Sprint PCS has submitted two *ex partes* in recent months, which it attaches to these comments to ensure other parties have seen them.

¹² For example, NTIA has determined that "for a ten-fold increase in [UWB] emitter density, the received aggregate power will increase by ten dB, and for a hundred-fold increase by 20 dB." NTIA Report 01-43 at 5-2.

¹³ *New Channels Communications*, 57 F.R.2d 1600 ¶ 6 (1985). See also *Industrial Communications*, 6 FCC Rcd 264, 265 ¶ 12 (1990) ("It is the burden of the applicant to demonstrate interference-free operation."); *Waynesboro Broadcasting*, 1 F.C.C.2d 431, 432-33 ¶ 3 (1965) ("[T]he burden of proof is upon the applicants to show that interference will not be caused to [existing] installations by their proposals.").

cause harmful interference to CDMA systems – the technology that will be used to support all third-generation (“3G”) mobile systems. Accordingly, the Commission should prohibit the use of UWB devices in PCS licensed spectrum.

II. THE COMMISSION NEEDS TO CONSIDER THE NEGATIVE IMPACT THAT UWB DEVICES WILL CAUSE TO E911 SERVICES

Sprint’s filings in this docket, to date, have focused on “ordinary” PCS service, the service that millions of Americans use in their daily lives. However, Sprint is disturbed by Qualcomm’s conclusion that UWB devices “will have a severe impact” on the performance of the enhanced 911 (“E911”) solutions that Sprint PCS and other carriers are implementing at great expense.

The Commission, in discharging its statutory mandate to “promot[e] safety of life and property,”¹⁴ has ordered wireless carriers to provide to public safety answering points (“PSAPs”) location information with 911 calls. Carriers have already begun to convert their networks to support Phase I E911, which provides the address of the serving base station (or cell site). However, the Commission has also ordered carriers to support Phase II E911 service, which provides a far more precise location of the calling mobile customer.¹⁵

The Commission’s primary goal in its E911 proceeding has been to “improve ALI accuracy” because improved accuracy will “significantly facilitate and speed emergency response” while “also making the selective routing of calls to PSAPs more accurate and

¹⁴ See 47 U.S.C. § 151.

¹⁵ See 47 C.F.R. § 20.18(d)-(h).

reliable.”¹⁶ For example, carriers like Sprint PCS that use a GPS-based handset solution must provide location within 50 meters for 67% of all E911 calls.¹⁷

Sprint thus finds troubling Qualcomm’s conclusion that UWB devices “will have a severe impact” on the performance of GPS-based systems. Qualcomm notes three potential adverse impacts:

1. UWB interference could preclude a PCS handset from accessing the GPS signals, meaning that the carrier must instead supply to public safety the far less accurate Phase I cell site data;
2. UWB interference could cause higher errors, resulting in carriers providing inaccurate locations information to public safety; and
3. UWB interference could degrade the GPS receiver acquisition time, resulting in longer response times.¹⁸

Introduction of UWB devices into the market (using 2 GHz spectrum) thus have the potential to undermine the important public safety objectives the Commission has sought to achieve in its E911 proceeding.

The Commission stated, in its *UWB NPRM*, that it is “vitally important to ensure that critical safety systems . . . are protected from harmful interference.”¹⁹ Given the importance the Commission has attached to improving accuracy in wireless E911 calls, and given the enormous sums wireless carriers are spending to implement the Commission’s orders, now is not the time for the Commission to take steps to reduce the accuracy or reliability of the location information that wireless carriers provide to PSAPs. At minimum, UWB proponents wanting to use the 2 GHz band (and any other band in which E911 obligations will be imposed) must be required to

¹⁶ *Third E911 Order*, 14 FCC Rcd 17388, 17406 ¶ 36, 17422 ¶ 74 (1999).

¹⁷ 47 C.F.R. § 20.18(h)(2).

¹⁸ See Qualcomm Report at 25.

¹⁹ *UWB NPRM* at ¶ 28.

demonstrate that UWB poses no adverse effect on the ability of carriers to provide reliable, accurate location information with E911 calls.

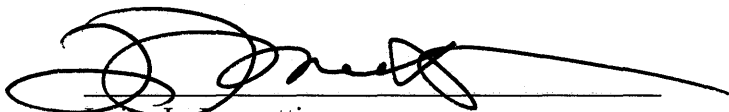
III. CONCLUSION

UWB proponents have had nearly three years to demonstrate that their devices can coexist with licensed services below 3.1 GHz without causing harmful interference. The UWB industry has not met its burden of proof. The Sprint PCS/Time Domain tests, and now the Qualcomm tests, confirm that UWB devices will cause substantial harmful interference to CDMA systems. The Commission should take action now and prohibit the use of UWB devices in the licensed spectrum below 3.1 GHz.

Respectfully submitted,

SPRINT CORPORATION

April 25, 2001



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Attachments



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February 21, 2001

By Hand Delivery

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Room TW-B204
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RECEIVED

FEB 21 2001

**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY**

Re: *Written Ex Parte Notification*
Revision of Part 15 of the Commission's Rules Regarding
Ultra-Wideband Transmission Systems, ET Docket No. 98-153
UWB Interference to CDMA PCS Networks

Dear Ms. Salas:

Sprint Spectrum L.P., d/b/a Sprint PCS, pursuant to Section 1.1206 of the Commission's rules, hereby submits an original and two copies of a notification of a written *ex parte* contact. Please associate this letter with the file in the above-captioned proceeding.

Please contact me should you have any questions concerning the foregoing.

Sincerely yours,

Charles W. McKee by *ACJ*

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February 21, 2001

By Hand Delivery

Mr. Bruce A. Franca, Acting Chief
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Federal Communications Commission
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***Re: Written Ex Parte Presentation
Revision of Part 15 of the Commission's Rules Regarding
Ultra-Wideband Transmission Systems, ET Docket No. 98-153
UWB Interference to CDMA PCS Networks***

Dear Mr. Franca:

Sprint Spectrum L.P., d/b/a Sprint PCS ("Sprint PCS"), below responds to certain criticism that two parties have made regarding the conclusions it has drawn from the Sprint PCS/Time Domain/Telcordia study of the impact of UWB devices on CDMA PCS networks. While Sprint PCS recognizes the importance of the NTIA testing that has recently been released, the Commission must be careful not to overlook the equally significant impact UWB devices would have on mobile networks. Specifically, the Commission should recognize the substantial impact UWB devices will have on CDMA networks, the base technology for *all* third generation ("3G") systems.

As demonstrated below, the factual issue in this proceeding is no longer whether UWB devices will cause harmful interference to CDMA PCS networks. The factual issue has rather become how often this interference will occur and how harmful this interference will be. Some UWB proponents recognize that the interference risk posed by UWB devices is significant and that as a result, UWB devices should not be permitted to operate in the PCS band or other bands below 3.1 GHz. Two UWB proponents, however, incorrectly claim that the probability of harmful interference will not be large.

In the end, the resolution of the factual issue of how much harmful interference UWB devices will generate is not legally significant. The federal government has re-

ceived sizable consideration for issuing “exclusive” PCS licenses to Sprint PCS. Having formed a contract with Sprint PCS, the government is not free to breach this contract by converting these licenses into “non-exclusive” licenses. The government certainly is not free to require Sprint PCS to share its spectrum for free so others can provide telecommunications services that could compete with Sprint PCS’ own services.

Background

On September 12, 2000, Sprint PCS and Time Domain Corporation jointly submitted two documents in this ultra-wideband (“UWB”) rulemaking proceeding.¹ The first document is a model that Telcordia Technologies developed, with substantial consultation with Sprint PCS and Time Domain, to analyze the impact of UWB transmitters on the forward link of a code-division multiple access (“CDMA”) personal communications services (“PCS”) network.² The second document summarized the tests that Sprint PCS, Time Domain and Telcordia conducted to better understand the effect of a UWB transmitter on a PCS handset under controlled conditions.³ These tests included laboratory bench tests with conducted RF paths, over-the-air tests in an anechoic (RF absorber-lined) chamber, and field tests at Sprint PCS’ laboratory.

Sprint PCS summarized the practical effects of this model and these tests in supplemental comments filed on October 6, 2000.⁴ Specifically, the data confirmed that UWB devices will cause harmful interference to PCS CDMA networks even at the more stringent -53.2 dBm/MHz average power level discussed in the *NPRM*.⁵ One effect of UWB interference was the loss of existing PCS network capacity. At the -53.2 dBm/MHz emissions level, a fair signal (-90 dBm RSSI) PCS handset will ask for 8% more power when exposed to a UWB device two meters away. A weaker signal (-100 dBm RSSI) handset will demand 50% more power. The network capacity loss at a base station could be considerable if several PCS customers are near active UWB devices. As

¹ See Letter from Charles W. McKee, Sprint PCS, to Magalie Roman Salas, FCC Secretary, ET Docket No. 98-153 (Sept. 12, 2000), and Letter from Jeffrey S. Ross, Time Domain, to Magalie Roman Salas, FCC Secretary, ET Docket No. 98-153 (Sept. 12, 2000).

² See Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, “A Model for Calculating the Effect of UWB Interference on a CDMA PCS System” (Sept. 12, 2000), *appended as Attachment 1* to the September 12, 2000 Sprint PCS and Time Domain letters.

³ See Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, “Summary of Testing Performed by Sprint PCS and Time Domain to Characterize the Effect of Ultra Wideband (UWB) Devices on an IS-95 PCS System” (Sept. 12, 2000), *appended as Attachment 2* to the September 12, 2000 Sprint PCS and Time Domain letters.

⁴ See Sprint PCS Supplemental Comments, ET Docket No. 98-153 (Oct. 6, 2000).

⁵ See *UWB NPRM*, ET Docket No. 98-153, FCC 00-163, 15 FCC Rcd 12086 (May 11, 2000).

an example, using the more stringent -53.2 dBm/MHz average power level, a medium sized city (200 cell sites), and a significant distribution of UWB devices, Sprint PCS would be able to serve from 250 to 1,000 fewer customers at times during the busy hour — solely as a result of UWB interference.

A second and separate effect of UWB interference is call blocking — namely, a PCS call will drop or a call attempt will be blocked if the handset is too close to an active UWB device. At the -53.2 dBm/MHz emission level suggested in the *NPRM* (and assuming that between one in twenty and one in five PCS customers are within three meters of an active UWB device), the model demonstrates that the resulting additional blocking percentages are from 1.2% to 4.8% respectively. At two meters, the additional blocking rates increase to 2.0% and 7.9% respectively. To put these figures into perspective, Sprint PCS spends tens of millions of dollars each year adding “capacity” cell sites to reduce its call blockage. Encountering new blockage rates of 4% to 8% would require significant additional millions to address.

Some UWB proponents readily acknowledge that UWB devices should not be permitted to operate at all in the 1.9 GHz PCS band.⁶ For example, Multispectral Solutions (“MSSI”), which has over a decade of experience in developing UWB technologies, recognizes that UWB will cause “significant” interference to PCS networks, and it accordingly recommends that unlicensed UWB devices not be permitted to operate in the frequency range below 3.1 GHz.⁷

Notably, even those UWB proponents wanting to use the PCS band now concede that UWB devices will cause harmful interference to PCS networks. They assert that the Commission should nonetheless approve UWB use in the PCS band because of their belief that the probability of harmful interference is “not significant.”⁸

Response to XtremeSpectrum and Time Domain

Of the over three dozen reply comments that were filed, only two parties — XtremeSpectrum and Time Domain — chose to question the conclusions Sprint PCS drew from the Sprint PCS/Time Domain/Telcordia model and data. Sprint PCS below responds to the points made by these two firms.

⁶ See, e.g., Multispectral Solutions Comments at 10-12; Fantasma Networks Comments at 3.

⁷ See Multispectral Solutions Reply Comments at 1-2. See also *id.* at 3 (“While higher frequency operation may require some additional engineering effort [for UWB devices] it is a far better alternative than interference to safety-of-life and other key commercial spectrum users.”).

⁸ Time Domain Reply Comments at 38.

XtremeSpectrum: XtremeSpectrum, though not challenging any of Sprint PCS' data or conclusions, asserts that the probability of interference will be small because UWB devices "produce a very small area of interference."⁹ This assertion conflicts with the claim that UWB technology will be used in local area networks ("LANs").¹⁰ If, in fact, the path loss (the reduction in signal strength from a UWB transmitter as it transmits a building) is as great as XtremeSpectrum claims, UWB could not be used as a wireless LAN technology because the expectation of these types of products is to transmit up to 100 feet or farther. XtremeSpectrum cannot have it both ways.

XtremeSpectrum further asserts that the probability of interference will be small because while PCS has "some indoor applications, everyday experience suggests that the large majority of use is outdoors."¹¹ This entirely unsupported claim, while it may have been true some years ago, is certainly not accurate today. A growing segment of mobile customers are people who use their wireless service as a replacement for land-line service.¹² Another sizable percentage of customers use their mobile phone at home or at work to make long distance calls, as free long distance is included in many of the "bucket" plans that customers purchase. Indeed, some would say that the use of wireless phones in indoor environments has become so pervasive that cell phones have become a nuisance.¹³ The extensive and growing use of PCS indoors is beneficial to consumers and competition. However, this trend would stop (if not retreat) if customers no longer had confidence that their PCS phone will work at home, in the office, or at other indoor locations.

XtremeSpectrum finally asserts that the probability of interference will be small because in many circumstances the same person will control both the UWB device and the PCS handset, "allowing the ultra-wideband device to be shut down as desired by the user."¹⁴ Even ignoring the many situations where its "solution" has no applicability (e.g., office setting, home visitors), XtremeSpectrum's solution is no solution at all. Faced with a UWB device that works and a PCS handset that does not, most consumers

⁹ XtremeSpectrum Reply Comments at 8.

¹⁰ See, e.g., Time Domain Reply Comments at 16 and 41 (describing UWB LANs as an "exciting" and likely prevalent application).

¹¹ *Id.* at 11.

¹² See generally Knight Ridder/Tribune Business News, "Consumers Replacing Landline Phones with Wireless" (Jan. 10, 2001).

¹³ In response, restaurants, theaters and concert halls have begun imposing restrictions on the use of cell phones.

¹⁴ XtremeSpectrum Reply Comments at 12.

will conclude that the reason the handset does not work is due to inferior PCS service; few (if any) consumers would realize that the handset problem is actually caused by UWB interference. Consumers would therefore need to be trained about UWB interference problems, but who — PCS carriers or UWB vendors — would shoulder the burden of this education effort? Will UWB vendors alert consumers only in their product manuals — such that consumers would not learn of the interference problem until after they purchased the UWB device?

More fundamentally, XtremeSpectrum's solution would impose a choice that consumers should not be compelled to make.¹⁵ Many customers use their PCS phone as their second line so, for example, they can make and receive calls while accessing the Internet from their computer using their landline. According to XtremeSpectrum, consumers should be forced to make the following choice: turn off their PCS phone while using the Internet (undercutting the very reason they use PCS as a second line), or turn off the computer. The Commission should not force consumers to make such a Hobson's choice.

Time Domain: Time Domain acknowledges that the Telcordia model it and Sprint PCS commissioned is an "excellent theoretical analysis" and that the anechoic chamber tests "confirm the model's predictions."¹⁶ It asserts, however, that the "results from real-world tests differed dramatically from the model's predictions."¹⁷ Sprint PCS must respectfully disagree. While there were some data collection issues with the "live" tests, the Telcordia scientist that Time Domain retained holds the view that the data is adequate to confirm the model's predictions:

Although the available data set from this live testbed experiment is limited, it does seem consistent with interference calculations based on the tests in the anechoic room and with the way in which the forward link is understood to manage its traffic channel power allocation.

Overall, the tests described here have provided enough information to allow the effect of multiple UWB transmitters, with some specified

¹⁵ It bears emphasis that while UWB does have some unique applications, most consumer applications would involve applications that can, and are, being addressed by other, non-UWB wireless applications. See, e.g., Sprint Reply Comments at ii-iii.

¹⁶ Time Domain Reply Comments at 39.

¹⁷ *Id.*

transmitted power and spatial density (average number of devices per square meter) to be modeled and simulated.¹⁸

Time Domain next asserts that Sprint PCS' analysis "unrealistically assumes that a -105 dBm level represents an adequate received power level for [PCS] service" and that Sprint PCS should instead be designing its network at a -95 dBm level:

Rayleigh fades and other sources of noise are sufficiently common that the threshold for evaluation should be at a minimum of -95 dBm. At this level, a Part 15 TM-UWB device should not have a significant impact unless it is less than 1.5 meters away from the CDMA handset, and probably closer to 1 meter.¹⁹

At the outset, Sprint PCS must express its surprise that Time Domain thinks that it is more competent than Sprint PCS in designing CDMA PCS networks that operate in the real world.

Sprint PCS' CDMA network is designed using link budget analysis, a method for designing proper coverage and network capacity. These link budgets include margins for fading, intra- and inter-cell interference, and a receive sensitivity for the handset of -105 dBm with the intent of having handsets operate at this level of sensitivity. Sprint PCS would incur enormous costs if, as Time Domain suggests, Sprint PCS must redesign its networks to -95 dBm to allow for UWB interference. And it is important to note that even Time Domain concedes that this massive PCS network redesign would not eliminate UWB interference, but only reduce the level of interference (with Time Domain claiming that UWB devices "*should* not have a significant impact *unless* . . .").

Time Domain also asserts that the probability of harmful interference is small because the most likely application of UWB technology is as a wireless LAN and it "would appear that the duty cycle of a WLAN is relatively low — perhaps less than 0.1% of the time."²⁰ This argument is disingenuous and highly misleading. The analogy would be for one to assert that rush hour traffic jams do not exist based on the fact that a freeway is designed to handle all traffic flows so long as the traffic flows are av-

¹⁸ Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, "Summary of Testing Performed by Sprint PCS and Time Domain to Characterize the Effect of Ultra Wideband (UWB) Devices on an IS-95 PCS System," at 4-5 (Sept. 12, 2000), *appended as Attachment 2* to the September 12, 2000 Sprint PCS and Time Domain letters.

¹⁹ Time Domain Reply Comments at 41 (emphasis omitted).

²⁰ Time Domain Reply Comments at 42.

eraged over a 24-hour period. Time Domain's argument also ignores the clear trend in the LAN environment. As applications like video streaming, video conferencing, and voice over IP become commonplace, the duty cycle of wireless LANs will become much higher.

Time Domain finally dismisses Sprint PCS' concern that the aggregation of nearby UWB devices will significantly increase the probability of harmful interference, although it recognizes that the Telcordia model it funded concluded that "it is the density of the active TM-UWB transmitters that is of interest in determining the effect of the TM-UWB emissions."²¹ Suffice it to say that Time Domain's position is not shared by the NTIA, which has characterized Time Domain's assertions as "misleading" and which has concluded that the presence of multiple UWB devices in the same area will likely have a "significant" impact on interference levels.²²

In summary, neither XtremeSpectrum nor Time Domain has presented any reason to undermine the most reasonable conclusions that can be drawn from the Time Domain/Sprint PCS/Telcordia model and testing — namely, UWB devices will cause significant harmful interference to sophisticated CDMA PCS networks. The Commission certainly cannot approve UWB based on the unsupported assertion that it "seems unlikely" that UWB interference will not be harmful to PCS networks.²³

The Legal Issue That Neither Time Domain and XtremeSpectrum Has Addressed

Time Domain wants the Commission to enter an order that would *require* PCS licensees to share their spectrum *for free* so it can provide (or license devices that provide) telecommunications services in competition with licensed PCS services.²⁴ In

²¹ Time Domain Reply Comments at 40 and Appendix A at 15.

²² See NTIA, "Assessment of Compatibility Between Ultrawideband Devices and Selected Federal Systems," NTIA Special Publication 01-43, at x, 5-25, 6-4 (Jan. 2001) ("Thus, for a ten-fold increase in emitter density, the received aggregate power will increase by ten dB, and for a hundred-fold increase by 20 dB."). Time Domain also complains that the Telcordia model it funded is incomplete because it did not include multipath fading and inter-cell interference from other handsets. But in making this complaint, Time Domain does not mention other factors that were not considered and that would have increased the negative impact of UWB on PCS networks (e.g., impact of inter-cell interference of UWB devices and impact of multiple UWB devices in close proximity to a handset).

²³ Time Domain Reply Comments, Appendix A at 18.

²⁴ See, e.g., Time Domain Reply Comments at 2 ("[D]eployment of UWB devices is in the public interest and can be achieved by regulations that allow for compatible spectrum sharing with existing services."); at Appendix A at 15 ("Many of the UWB manufacturers are targeting the wireless local area network marketplace.").

making this proposal, Time Domain acknowledges that UWB devices will pose a risk of harmful interference, but it claims that this risk is “not significant.”²⁵ The Commission cannot grant the Time Domain request even if it was willing to accept Time Domain’s unsubstantiated claims.

Sprint PCS has paid approximately \$3.5 billion to acquire and clear its PCS spectrum, and it has invested another \$12 billion in constructing its nationwide, state-of-the-art CDMA network. Sprint PCS made this massive investment with the express understanding that it would hold “an exclusive right to use the designated portion of the electromagnetic spectrum for the term of the license.”²⁶ Having received valuable consideration for issuing exclusive licenses, the Commission does not now have the legal right to convert these licenses into non-exclusive licenses and to require Sprint PCS to share its spectrum with others, much less share its spectrum for free.²⁷

Conclusion

Time Domain and XtremeSpectrum dismiss the concerns of licensees holding spectrum below 3.1 GHz as “ungrounded fears” because existing licensees, “lacking hard information, tend to assume the worst.”²⁸ Sprint PCS’ concerns are neither ungrounded nor unsupported with hard facts. To the contrary, the data it has submitted (with Time Domain) documents that the risk of harmful interference by UWB devices to PCS CDMA networks is both real and significant.

The threat to the wireless industry should not be understated. The conversion to 3G is a national priority, with the President noting that the technology will create “mobile-commerce (m-commerce) that people will use in ways that are unimaginable today.”²⁹ Mobile carriers recently paid the government \$17 billion to acquire additional PCS spectrum so they can begin deploying 3G technologies and begin providing 3G-

²⁵ Time Domain Reply Comments at 38.

²⁶ *Public Utility Commission of Texas*, 13 FCC Rcd 3460, 35003 ¶ 89 (1997). See also *First Microwave Relocation Order*, 7 FCC Rcd 6886, 6889 ¶ 18 (1992); *BellSouth v. FCC*, 162 F.2d 1215, 1223 (D.C. Cir. 1999).

²⁷ Given that the federal government has received valuable (and sizable) consideration for issuing PCS licenses, these licenses have effectively become a contract between the government and the licensee. The Supreme Court has repeatedly held in recent years that the government becomes liable if it breaches its contracts. See, e.g., *Mobile Oil v. United States*, No. 99-244 (June 26, 2000); *United States v. Winstar*, 518 U.S. 839 (1996).

²⁸ Time Domain Reply Comments at 2; XtremeSpectrum Reply Comments at 16.

²⁹ President Clinton, Memorandum for the Heads of Executive Departments and Agencies, “Advanced Mobile Communications/Third Generation Wireless Systems” (Oct. 13, 2000).

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Page 9

based services. Importantly, all carriers have announced their intention to use CDMA-based 3G technologies because of the efficiency in which CDMA uses spectrum. Now is not the time for the Commission to authorize unfettered UWB proliferation when the facts are undisputed that UWB devices will cause harmful interference to CDMA networks.

Respectfully submitted,

Sprint Spectrum L.P., d/b/a Sprint PCS

Charles W. McKee by [Signature]

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April 6, 2001

RECEIVED

APR 6 2001

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

By Hand Delivery

Ms. Magalie Roman Salas, Secretary
Federal Communications Commission
The Portals, 445 12th Street, S.W.
Room TW-B204
Washington, D.C. 20554

Re: *Written Ex Parte Notification*
Revision of Part 15 of the Commission's Rules Regarding
Ultra-Wideband Transmission Systems, ET Docket No. 98-153
UWB Interference to CDMA PCS Networks

Dear Ms. Salas:

Sprint Spectrum L.P., d/b/a Sprint PCS, pursuant to Section 1.1206 of the Commission's rules, hereby submits an original and four copies of a notification of a written *ex parte* contact. Please associate this letter with the file in the above-captioned proceeding.

Please contact me should you have any questions concerning the foregoing.

Sincerely yours,

Luisa L. Lancetti
Vice President, PCS Regulatory Affairs
401 9th Street, N.W., Suite 400
Washington, D.C. 20004
202-585-1923



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April 6, 2001

By Hand Delivery

Mr. Bruce A. Franca, Acting Chief
Office of Engineering and Technology
Federal Communications Commission
The Portals, 445 12th Street, S.W.
Washington, D.C. 20554

Re: *Written Ex Parte Presentation*
Revision of Part 15 of the Commission's Rules Regarding
Ultra-Wideband Transmission Systems, ET Docket No. 98-153
UWB Interference to CDMA PCS Networks

Dear Mr. Franca:

Sprint Spectrum L.P., d/b/a Sprint PCS ("Sprint PCS"), below responds to the proposal that Fantasma Networks made earlier this week. The Commission cannot grant the relief Fantasma seeks because the record evidence is uncontraverted that UWB devices would cause harmful interference to PCS licensees.

In an *ex parte* dated April 2, 2000, Fantasma recommended that the Commission bifurcate this proceeding between GPS frequencies and non-GPS frequencies and that it "move now to authorize UWB technologies that do not operate on GPS frequencies."¹ According to Fantasma, there is "ample record support for fast Commission action on non-GPS UWB technology."² In taking this position, however, Fantasma ignores completely the data and studies that Sprint PCS submitted documenting that that UWB de-

¹ Letter from Henry Goldberg, Attorney for Fantasma Networks, to Magalie Salas, FCC Secretary, Docket No. 98-153, at 1 (April 2, 2001) ("Fantasma *Ex Parte*"). Fantasma submitted its *ex parte* in response to an *ex parte* submitted by numerous members of industry on March 27, 2001. Sprint did not join this industry letter for several reasons, but primarily because the letter is based on fears of "potential adverse impact." In the case of PCS CDMA networks, the risk of UWB interference is documented, real, and significant. On the existing record, the FCC cannot approve operation of UWB devices in the PCS spectrum, and no additional notice is required to reject these requests for modification of Part 15 as applied to the PCS spectrum band.

² Fantasma *Ex Parte* at 3.

vices will cause harmful interference to mobile services (CMRS) networks that use CDMA technology — data and studies that Fantasma has never challenged. Thus, based on the existing record, the Commission cannot approve use of UWB devices in the 1.9 GHz PCS band and any other band that will be used for 3G services (since all 3G-based networks will be using CDMA, whether cdma2000 or W-CDMA).³

Last year Sprint PCS and Time Domain Corporation conducted joint tests to determine the impact that UWB devices may have on PCS CDMA networks. On September 12, 2000, Sprint PCS and Time Domain jointly submitted a summary of the test results and an impact analysis model that Telcordia Technologies prepared.⁴ The data confirmed that UWB devices will cause harmful interference to PCS CDMA networks even at the more stringent -53.2 dBm/MHz average power level discussed in the *NPRM*.⁵ One effect of UWB interference was the loss of existing PCS network capacity. At the -53.2 dBm/MHz emissions level, a fair signal (-90 dBm RSSI) PCS handset will ask for 8% more power when exposed to a UWB device two meters away. A weaker signal (-100 dBm RSSI) handset will demand 50% more power. The network capacity loss at a base station could be considerable if several PCS customers are near active UWB devices.⁶

A second and separate effect of UWB interference is call blocking — namely, a PCS call will drop or a call attempt will be blocked if the handset is too close to an active UWB device. At the -53.2 dBm/MHz emission level suggested in the *NPRM* (and assuming that between one in twenty and one in five PCS customers are within three meters of an active UWB device), the model demonstrates that the resulting additional blocking percentages are from 1.2% to 4.8% respectively. At two meters, the additional blocking

³ Sprint paid the federal government significant sums (over \$3 billion) for its exclusive PCS licenses. Given this exclusive license grant, FCC authorization of new uses of this same spectrum would constitute a breach of contract and an unlawful modification of licenses, for which the government would be liable in damages. See, e.g., Sprint Reply Comments, Docket No. 98-153, at 13-15 (Oct. 27, 2000); Sprint Ex Parte, Docket No. 98-153, at 7-8 (Feb. 21, 2001).

⁴ See Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, “A Model for Calculating the Effect of UWB Interference on a CDMA PCS System” (Sept. 12, 2000), *appended as* Attachment 1 to the September 12, 2000 Sprint PCS and Time Domain letters; Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, “Summary of Testing Performed by Sprint PCS and Time Domain to Characterize the Effect of Ultra Wideband (UWB) Devices on an IS-95 PCS System” (Sept. 12, 2000), *appended as* Attachment 2 to the September 12, 2000 Sprint PCS and Time Domain letters. See also Sprint PCS Supplemental Comments, ET Docket No. 98-153 (Oct. 6, 2000).

⁵ See *UWB NPRM*, ET Docket No. 98-153, FCC 00-163, 15 FCC Rcd 12086 (May 11, 2000).

⁶ As an example, using the more stringent -53.2 dBm/MHz average power level, a medium sized city (200 cell sites), and a significant distribution of UWB devices, Sprint PCS would be able to serve from 250 to 1,000 fewer customers at times during the busy hour — *solely as a result of UWB interference*.

rates increase to 2.0% and 7.9% respectively. To put these figures into perspective, Sprint PCS spends tens of millions of dollars each year adding “capacity” cell sites to reduce its call blockage rate by one percent. Sprint PCS would thus have to spend enormous sums in an attempt to overcome the significant call blockage that it would encounter as a result of new UWB interference.

Importantly, not one UWB proponent (including Fantasma) has challenged the data and model that Sprint PCS and Time Domain submitted, and none has challenged the fact that UWB devices will cause harmful interference to CDMA networks. They rather claim, without reciting any facts, that the instances where this interference will occur should be small.⁷ Sprint PCS has previously addressed this claim, and it will not repeat this discussion here.⁸ Suffice it to say here that Fantasma and other UWB proponents have not begun to meet their “burden of demonstrating that there is no potential for interference.”⁹

It bears emphasis that Sprint PCS is not alone in its views. For example:

- Qualcomm, the CDMA patent holder, independently reached the same conclusion as Sprint PCS, and Qualcomm has submitted its analysis in the record in this proceeding.¹⁰
- The NTIA, following its own, independent study, has concluded that the operation of UWB devices below 3.1 GHz “will be challenging.”¹¹
- Several UWB proponents readily acknowledge that UWB devices should not be permitted in the spectrum bands below 3.1 GHz. For example, Multispectral Solutions (“MSSI”), which has over a decade of experience in developing UWB technologies, recognizes that UWB

⁷ See, e.g., Fantasma Reply Comments on NTIA Non-GPS Compatibility Study, Docket No. 98-153, at 3 (March 12, 2001).

⁸ See Sprint PCS *Ex Parte*, Docket No. 98-153 (Feb. 21, 2001). The interference risk of UWB devices could actually be more severe than what Sprint PCS anticipates. See, e.g., D.J. Caera, Aerospace Online, “Ultra Wide Band Radio — Miracle or Menace?” (Jan., 31, 2001)(“[E]ach of us could come to depend on as many as eight separate UWB devices in our personal lives.”).

⁹ *New Channels Communications*, 57 F.R.2d 1600 ¶ 6 (1985). See also *Industrial Communications*, 6 FCC Rcd 264, 265 ¶ 12 (1990)(“It is the burden of the applicant to demonstrate interference-free operation.”); *Waynesboro Broadcasting*, 1 F.C.C.2d 431, 432-33 ¶ 3 (1965)(“[T]he burden of proof is upon the applicants to show that interference will not be cause to [existing] installations by their proposals.”).

¹⁰ See Qualcomm *Ex Parte*, Docket No. 98-153 (March 8, 2001).

¹¹ NTIA Report, “Assessment of Compatibility Between Ultrawideband Devices and Selected Federal Systems,” NTIA Special Publication 01-43, Docket No. 98-153, at x (Jan. 2001).

will cause “significant” interference to PCS networks, and it accordingly recommends that unlicensed UWB devices not be permitted to operate in the frequency range below 3.1 GHz.¹²

Unfortunately, while some UWB advocates have claimed that UWB operates in the “garbage band” and can superimpose its emissions on existing services without interference thereby “creating spectrum,” such statements are without basis in fact and, in fact, have shown to be false.¹³

It may be appropriate for the Commission to consider use of UWB devices in the spectrum bands above 3.0 GHz, as some UWB proponents have recommended.¹⁴ But based on the undisputed record evidence, the conclusion is inescapable that the Commission must reject use of UWB on the PCS band and any other band where CDMA will be used in the provision of mobile services — including 3G technologies.

Fantasma and certain other UWB proponents advocate a rather novel public policy position. They not only want to use Sprint PCS’ spectrum for free to provide telecommunications services in competition with Sprint PCS’ services, but they also expect Sprint PCS to spend additional millions in modifying its network in an attempt to accommodate their use of its spectrum!

Sprint PCS submits that the Commission does not have the legal right to convert its exclusive licenses into non-exclusive licenses that it must now share with new competitors. The Commission need not reach this legal issue, however, because given the UWB’s community’s concession that UWB devices will interfere with Sprint PCS’ net-

¹² See MSSSI Reply Comments, Docket No. 98-153, at 1-2 (Oct. 27, 2000). See also *id.* at 3 (“While higher frequency operation may require some additional engineering effort [for UWB devices] it is a far better alternative than interference to safety-of-life and other key commercial spectrum users.”).

¹³ See MSSSI Comments, Docket No. 98-154, at 10-12 (Sept. 12, 2000). See also *id.* at 1 (Unfiltered UWB systems “should not be permitted under Part 15,” and filtered systems should initially be permitted only “above 3.1 GHz.”); at 13 (“[T]here is no compelling reason to operate below 3.1 GHz for the types of applications contemplated for UWB communications and radar.”).

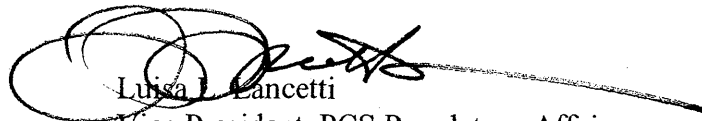
¹⁴ See, e.g., MSSSI Reply Comments, Docket No. 98-154 (Feb. 22, 2001); MSSSI Reply Comments, Docket No. 98-153 (March 6, 2001).

Mr. Bruce A. Franca
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Page 5

work, UWB proponents have not, and cannot as a matter of law, satisfy their burden of demonstrating that there is "no potential for interference."¹⁵

Respectfully submitted,

Sprint Spectrum L.P., d/b/a Sprint PCS



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¹⁵ *New Channels Communications*, 57 F.R.2d 1600 ¶ 6 (1985).

CERTIFICATE OF SERVICE

I, Jo-Ann Monroe, hereby certify that on this 25th day of April, 2001, a copy of the foregoing Sprint Comments were served by first-class, U.S. mail, postage prepaid to the following:

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Jo-Ann Monroe